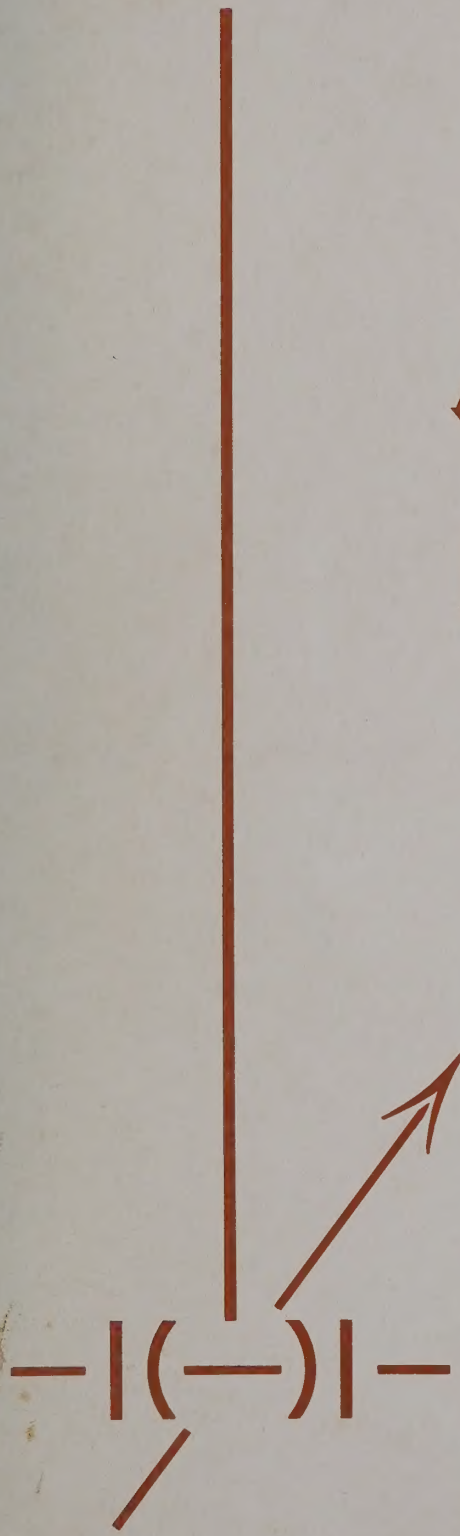
ARC TYPE BTK-18
BENCH TEST KIT



AIRCRAFT RADIO CORPORATION

Boonton, New Jersey

ARC TYPE BTK-18
BENCH TEST KIT

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Boonton, New Jersey

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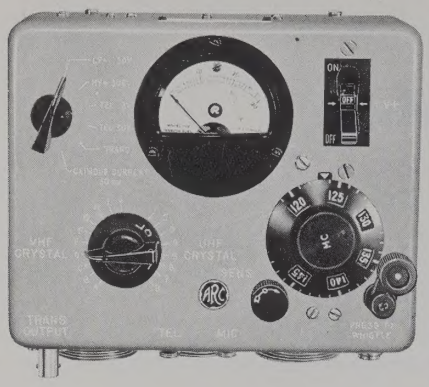
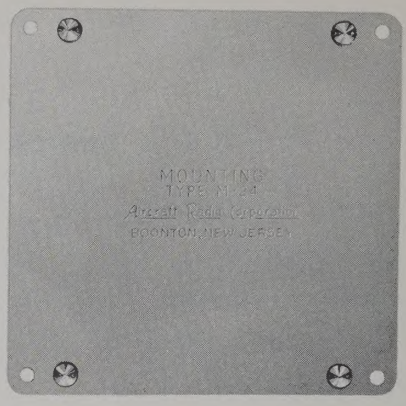
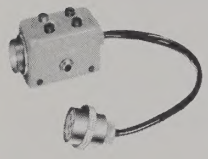


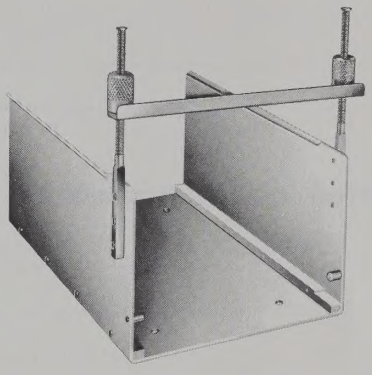
TEST UNIT ARC TYPE H-18
ARC–18255



MOUNTING ARC TYPE M-24
ARC–16710



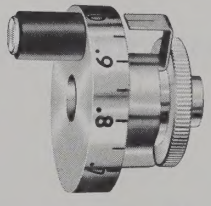
CABLE ASSEMBLY
ARC–20689



TEST RACK
ARC–16083

CABLE HARNESS ASSEMBLY
ARC–18266

CABLE ASSEMBLY
ARC–11369



TUNING KNOB
ARC–18802

MECHANICAL LINKAGE
ARC–16158

WRENCH
ARC–10307

TEST PROBE
ARC–16139

TP1030

Figure 1–1. ARC Type BTK-18 Bench Test Kit

SECTION I
GENERAL INFORMATION

1–1. PURPOSE.

The ARC Type BTK-18 Bench Test Kit is designed to facilitate bench testing specific units of the ARC Type 12 Equipment. These units are: ARC Type K-13 Oscillator-Relay Unit, ARC Type TV-10 Transmitter-Converter, ARC Type R-19 Receiver, ARC Type R-20 and R-20A Receivers, and ARC Type T-11A, T-11B, T-13, T-13A, T-21, and T-23 Transmitters. These units may be tested either individually or as a system.

1–2. UNITS SUPPLIED.

The units supplied as part of Bench Test Kit ARC Type BTK-18 are listed in Table 1-1 and illustrated in Figure 1-1.

TABLE 1–1. UNITS SUPPLIED

Quantity	Unit	ARC Part Number
1	Test Unit ARC Type H-18	18255
1	Cable Harness Assembly	18266
1	Cable Assembly	20689
4	Cable Assembly	11369 (4 ft)
1	Mechanical Linkage	16158 (5 ft)
3	Test Rack	16083
1	Tuning Knob	18802
1	Test Probe	16139
1	Wrench	10307
1	Mounting ARC Type M-24	16710
1	Instruction Book	——

1–3. AUXILIARY EQUIPMENT.

The ARC Type BTK-18 Bench Test Kit is intended for use with other test equipment. Suggested test equipment is listed in Table 1-2; however, equivalent test equipment may be substituted.

1–4. MEASUREMENTS AND TESTS.

The ARC Type BTK-18 and the test equipment listed in Table 1-2 can be used for the following measurements and tests:

1. Primary input voltage measurements.
2. Dynamotor output voltage measurements.
3. R-19 Receiver alignment.
4. Cathode current for R-19 Receiver avc check.
5. R-19 Receiver audio output.
6. R-19 Receiver r-f and i-f sensitivity.
7. R-19 Receiver tuning calibration.
8. R-20 and R-20A Receiver alignment, audio output, and lamp relay tests.
9. Tuning vhf transmitters for maximum power output at a desired frequency.
10. Comparison of vhf transmitter power output.
11. Vhf transmitter modulation test.
12. Checking vhf transmitter frequency-range coverage.
13. TV-10 transmitter test.
14. TV-10 110-mc oscillator test.
15. TV-10 crystal mixer test.
16. TV-10 over-all sensitivity check.
17. K-13 1-kc oscillator output test.
18. Uhf and vhf "whistle-through" tests.
19. Uhf and vhf "whistle-through" level adjustments.
20. General resistance and voltage measurements.

TABLE 1–2. AUXILIARY EQUIPMENT

Quantity	Name	Designation or Required Characteristics
1	Audio Oscillator	Hewlett-Packard Model 200AB
1	Multimeter	Simpson Model 260
1	Signal Generator	Hewlett-Packard Model 608D*
1	Attenuator, 6-db	Boonton Radio Corporation Type 505-B
1	Adapter UG-201/U	——
1	Adapter UG-349/U	——
1	Tube Tester	Weston Model 798
1	Headset	High-impedance (minimum 5000 ohms)
1	Low-voltage supply	14- or 28-volt storage battery or rectifier d-c supply.
1	Ammeter	Weston Model 301 (0-100 μa movement)
1	"Standard" ARC Type R-19 Receiver† (with D-10A Dynamotor)	Supplies high voltage to the test system and permits "whistle-through" testing.

* A signal generator with the characteristics of the Hewlett-Packard Model 608D is desired because it produces all necessary signals for receiver alignment as well as those necessary to check the operation of the TV-10 converter section.

† The "standard" R-19 Receiver is a receiver whose characteristics are known, not the receiver under test.

1–5. DESCRIPTION OF UNITS.

Test Unit. The ARC Type H-18 Test Unit is the control center and major unit of the BTK-18. It contains the switching and tuning controls, input and output connectors, test meter, and primary power circuit breaker. The H-18 is intended for wall-mounting by means of its back cover plate. In this position the operating controls and test meter are on the front of the chassis. The cable connectors, headset and microphone jacks, and the mechanical linkage connector are on the bottom of the chassis.

Cable Harness Assembly. Cable Harness Assembly ARC-18266 interconnects the H-18, the primary power source, and the units under test. It consists of suitable wire lengths terminated in 11 plug-type connectors and two bare, tinned leads. The bare, tinned leads are used to connect the low-voltage source. The interconnection of the cable harness assembly and the H-18 is made through three 19-pin receptacles on the bottom of the chassis.

Cable Assembly ARC-20689. Cable Assembly ARC-20689 is used to test ARC Type R-20 and R-20A Marker Beacon Receivers. In use, it is connected between the R-20 or R-20A Receiver under test and Cable Harness Assembly ARC-18266. The Cable Assembly consists of a 9-inch, 5-conductor cable terminated at one end with an ARC-20764 plug and at the other end in a metal box. Four test jacks, a telephone jack, and a 6-pin receptacle are mounted on the box. The tip jacks are used to test the lamp relay and audio circuits. The telephone jack is used for connecting a headset. The box contains a 300-ohm audio load resistor and a 4700-ohm resistor in series with the PHONES jack. The series resistor prevents the headset from shunting the audio load resistor and also limits the audio signal applied to the headset. Schematic and wiring diagrams are shown in Figures 3-5 and 3-6.

Cable Assembly ARC-11369. Four coaxial cable assemblies (ARC-11369), each 4 feet long, are supplied. These cable assemblies are terminated at each end with plug ARC-11337 (UG-88C/U). One length is used to connect the TRANS OUTPUT receptacle of the H-18 and the UHF ANT. receptacle of the TV-10. The remaining cables are used to connect the TV-10 to the R-19 and the vhf transmitter, and to connect the vhf transmitter to the K-13.

Mechanical Linkage Assembly. Mechanical Linkage Assembly ARC-16158 is a 5-foot length of flexible shafting enclosed in a metal casing which interconnects the tuning gears of the H-18 and the main tuning capacitor of the R-19. The mechanical linkage and the H-18 tuning crank permit remote tuning of the receiver. If remote tuning is not desired, Tuning Knob ARC-18802 may be used to tune the receiver.

Tuning Knob. Knob ARC-18802 is designed to be used in place of Mechanical Linkage ARC-16158 for direct-tuning of the R-19 Receiver. It consists of a crank handle with graduated dial coupled to a spline gear and an adjustable fiducial mark. The dial graduations are used as a reference for counting the number of dial-turns with relation to the tuning-capacitor frequency setting. The spline of the knob mates directly with the receiver tuning-capacitor spline.

Wrench. Wrench ARC-10307 is a special tool used to align the r-f, mixer, and oscillator trimmer capacitors in the R-19 Receiver.

Test Probe Assembly. Test Probe Assembly ARC-16139 is a coaxial cable terminated at one end with a special plug designed for insertion into the R-19 i-f test receptacle. The other end is terminated in a UG-89/U connector for connection to the signal generator used during test procedures.

Test Rack. Test Rack ARC-16083 is a U-shaped framework designed to mount the TV-10, R-19, R-20 or R-20A, or vhf transmitter. The unit is secured by a cross-bar (swung away during installation) and two knurled thumbnuts. The Test Rack is constructed to permit the unit under test to be mounted in a normal or upside-down position. Mounting holes are provided in the base to secure the test rack to the test bench.

Mounting ARC Type M-24. Mounting ARC Type M-24 is a metal mounting plate which contains four snap-slide studs. The K-13 is secured to the M-24 by engaging the four K-13 snapslides with the studs on the M-24. Four holes are provided in the M-24 to secure it to the test bench.

SECTION II
INSTALLATION AND OPERATION

2–1. INSTALLATION CONSIDERATIONS.

The units of the ARC Type BTK-18 Bench Test Kit may be mounted in any desired arrangement within the length-limits of the Cable Harness Assembly and Mechanical Linkage. The Test Unit should be securely fastened to a wall. The Test Racks should be mounted on the bench surface. These units may be fastened with wood screws, or machine screws and nuts. As an added precaution, a common ground strap should be connected between the Test Unit chassis, Test Racks, and Mounting. Test equipments and instruments required to complete the test system may be arranged in any convenient position in the test area.

2–2. INTERCABLING CONNECTIONS.

Figure 2-2 is an intercabling diagram illustrating the required interconnections between the H-18 and the units under test. The wiring between the H-18 receptacles and the receptacles of the units under test is shown in Figure 2-3. All cable, mechanical linkage, headset, and microphone connections are made at the underside of the test unit. The TRANS OUTPUT connector is a 50-ohm termination for connecting either the vhf or the uhf transmitter antenna cable. If the TV-10 and/or the K-13 are not included in the bench test system, dummy receptacle connectors must be substituted to permit proper operation of the H-18 Test Unit. These dummy receptacle connectors are chain-attached adjacent to the mating plug connector. When an R-20 or R-20A is under test, it replaces the transmitter used in the test set-up.

2–3. CONTROL FUNCTIONS.

Figure 2-1 shows the controls on the front panel of the H-18. The functions of the controls are as follows:

The test meter switch, in the upper left corner of the control panel, provides meter-switching for the following tests:

1. Primary-voltage test (LV+ 30V position).
2. High-voltage test (HV+ 300V position), with the high voltage for the entire system supplied by the D-10A Dynamotor mounted on the R-19 Receiver.
3. Telephone (headset) line audio voltage test across a built-in 300-ohm load (TEL 3V position); a full-scale reading is equivalent to 3 volts.
4. Telephone (headset) line audio voltage test across a built-in 300-ohm load (TEL 30V position), a full-scale reading is equivalent to 30 volts.
5. Transmitter power output test (TRANS position). The meter is used to determine transmitter operation, tune the transmitter to resonance, and serve as an indication of normal power output.
6. Cathode current test (CATHODE CURRENT 30 ma position). This test indicates the R-19 Receiver cathode current through the sensitivity control.

The LV+ control, in the upper right corner of the control panel, is an on-off, 10-ampere, circuit breaker switch. This switch controls the primary power to all equipment under test, and protects the equipment against overloads.

The crystal selector switch is in the lower left corner of the panel. The VHF CRYSTAL positions, indicated by the letters A through J, provide ten channels for the vhf transmitters. The UHF CRYSTAL positions, indicated by the numbers 1 through 8, provide eight channels for the TV-10. The LO-HI switch, which is part of the CRYSTAL SELECTOR switch, is used with the UHF CRYSTAL positions. The LO-HI fiducial line indicates the division of channels between the low and high bands of the TV-10. When the fiducial line is set between channel positions 4 and 5, channels 1 through 4 are in the low band and channels 5 through 8 are in the high band. When all eight channels are included in one band, the correct band may be selected by the proper positioning of the LO-HI fiducial line. For example: When all eight channels are in the high band, set the fiducial line to the left of UHF CRYSTAL position 1.

The SENS control is in the lower right corner of the panel, to the left of the frequency dial. The SENS control adjusts the r-f sensitivity of the receiver to the desired value; clockwise rotation increases sensitivity.

The tuning crank, in the bottom right corner of the panel, is used to tune the R-19 Receiver. Depressing the tuning crank permits "whistle-through" tuning of the R-19 to any of the transmitter crystal frequencies.

The frequency dial is located in the lower right corner of the panel. In its normal position the frequency dial indicates the vhf band between 118 and 148 megacycles. When uhf reception is in use, the frequency dial is solenoid-operated to show the uhf band between 228 and 258 megacycles.

2–4. PRELIMINARY PROCEDURE.

To prepare the BTK-18 for operation and testing, proceed as follows:

Step 1. Install a TV-10, R-19 with dynamotor, and vhf transmitter or R-20 or R-20A in the test racks. Secure a K-13 to the M-24 Mounting.

Step 2. Interconnect the H-18 and the units under test with Cable Harness Assembly ARC-18266, and if required, Cable Assembly ARC-20689, as shown in Figure 2-2.

Step 3. Connect the two bare, tinned leads to a 28-volt dc primary power source.

Note

Observe polarity when connecting the 28-volt dc power source. The two bare, tinned leads have polarity identification tags attached.

Step 4. With Mechanical Linkage ARC-16158 interconnected between the H-18 and R-19, rotate the H-18 tuning crank counterclockwise as far as it will go. Do not force the R-19 tuning capacitor past its stop.

Step 5. Disconnect the mechanical linkage at either end.

Step 6. Turn the tuning crank until the reference dot just to the right of the high end of the frequency dial is directly under the triangle-shaped fiducial mark.

Step 7. Replace the mechanical linkage taking care not to disturb the setting of the frequency dial or the R-19 tuning capacitor.

Step 8. Connect a headset and microphone to their respective jacks on the H-18.

Step 9. Throw the H-18 LV+ switch to the ON position. Allow approximately 3 minutes for warm-up, then set the low-voltage input to 27.5 volts.

Note

The dynamotor mounted on the R-19 supplies high voltage for all units under test. When testing or trouble-shooting components other than the dynamotor, install a dynamotor that is known to be good.

2–5. MEASUREMENTS AND TESTS.

General. The following military and commercial instruction books contain test procedures for ARC Type 12 Equipment:

Handbook of Maintenance Instructions, Radio Set ARC Type 12; USAF Publication No. T.O. 12R2-4-1-2; Navy Publication No. AN 16-45-122

Field Maintenance Instructions, Radio Set ARC Type 12; USAF Publication No. T.O. 12R2-4-1-42

Instruction Book for ARC Type 12 Equipment with UHF Supplement; ARC Publication No. ARCIB-12-2

Instruction Book for ARC Type R-20A Marker Beacon Receiver; ARC Publication No. ARCIB-R20A-1.

Reference to these handbooks and an understanding of the functions of the H-18 controls will facilitate performance and completion of these tests. The following paragraphs describe the measurements and tests made with the BTK-18.

Primary Input Voltage. Turn the test meter switch to the LV+ 30V position and note the H-18 meter reading.

Dynamotor Output Voltage. Turn the test meter switch to the HV+ 300V position and note the H-18 meter reading.

R-19 Receiver Alignment. Turn the test meter switch to the TEL 3V or TEL 30V position, as applicable, and observe the meter reading while adjusting the r-f and i-f trimmers. Detailed alignment procedures are given in the handbooks listed in paragraph 2-5.

R-19 Cathode Current AVC Check. Rotate the SENS CONTROL to its maximum clockwise position. Turn the test meter switch to the CATHODE CURRENT 30 ma position and note the meter reading.

R-19 Receiver Audio Output. Turn the test meter switch to the TEL 3V or TEL 30V position, as applicable, and note the meter reading. The SENS CONTROL varies the audio output; clockwise rotation increases the output.

R-19, R-F and I-F 10-Milliwatt Sensitivity. To measure the r-f 10-milliwatt sensitivity of the R-19 Receiver, proceed as follows:

Step 1. Adjust the signal generator to 144 megacycles, 30 per cent amplitude-modulated with 1000 cps, and connect its output through the Boonton Radio Corp. Type 505-B 6-db attenuator to the R-19 antenna input receptacle.

Note

The 6-db pad must be connected to the input connector of the unit under test and not to the output of the generator.

Step 2. Turn the test meter switch to the TEL 3V position and rotate the SENS control to its maximum clockwise position.

Step 3. Rotate the R-19 SQUELCH control (on the front panel) to its maximum clockwise position. Tune the R-19 to 144 megacycles.

Step 4. Adjust the signal generator output attenuator until the H-18 meter reads 1.73 volts.

Step 5. Read the r-f 10-milliwatt sensitivity in microvolts from the signal generator output attenuator dial.

To measure the R-19 i-f 10-milliwatt sensitivity, adjust the signal generator to 15 megacycles, 30 per cent amplitude-modulated with 1000 cps, and connect its output through the 6-db pad to the R-19 i-f test jack. Adjust the signal generator output attenuator to produce 1.73 volts on the meter. Read the i-f 10-milliwatt sensitivity in microvolts from the signal generator output attenuator.

R-19 Receiver Tuning Calibration.

Step 1. Remove the mechanical linkage from the R-19 Receiver.

Step 2. Fit Tuning Knob ARC-18802 over the R-19 tuning capacitor spline. Turn the tuning knob crank counterclockwise until it stops—do not force it beyond the stop point.

Step 3. Without disturbing the tuning capacitor setting, remove the tuning knob.

Step 4. Orient the tuning knob until the red zero line is in the 12 o'clock position. Without disturbing the tuning capacitor setting, reinstall the tuning knob and tighten the knurled nut.

Step 5. Rotate the collar on the tuning knob until the black fiducial line is aligned with the red zero line.

Step 6. Rotate the tuning crank clockwise 4.75 turns to set the tuning capacitor to 144 megacycles.

Step 7. Adjust the signal generator to 144 megacycles, 30 per cent amplitude-modulated with 1000 cps, and connect its output through the 6-db pad to the R-19 antenna input connector. Check the signal generator accuracy with its internal crystal calibrator.

Step 8. Using Wrench ARC-10307, adjust the R-19 oscillator trimmer capacitor to produce maximum audio output as indicated on the H-18 meter.

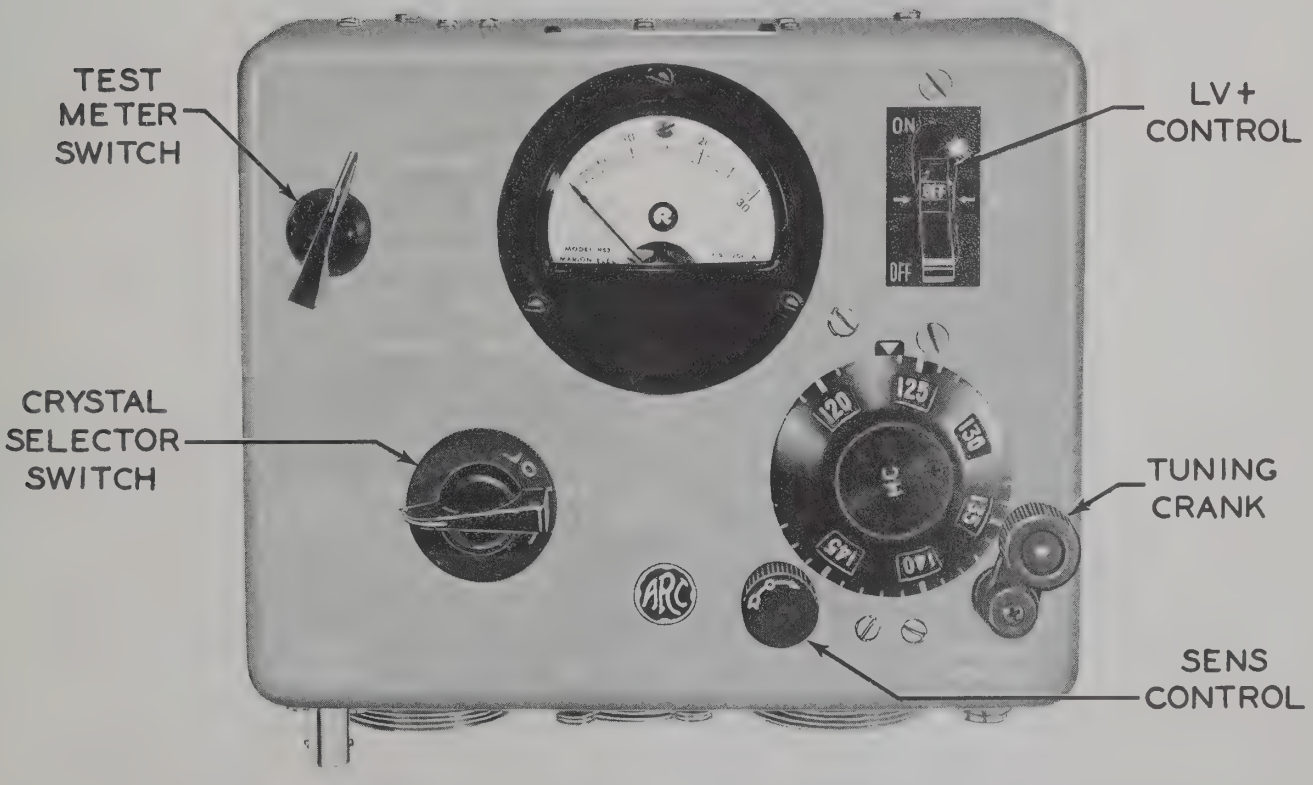


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Figure 2–1. ARC Type H-18 Test Unit, Front View

R-20 and R-20A Receiver Tests. The R-20 and R-20A alignment procedure is included in the publications listed in paragraph 2-5. The audio output and lamp relay tests are made using Cable Assembly ARC-20689. Disconnect the transmitter (if any), and connect the receiver under test as shown in Figure 2-2. The audio output from the receiver is measured across the TEL jacks on the Cable Assembly. The test headset is connected to the PHONES jack for aural reception. Lamp relay operation is checked by inserting a d-c voltmeter across the LAMP jacks. Primary voltage should appear across the LAMP jacks when the LAMP relay is energized.

Vhf Transmitter Tuning. To tune the vhf transmitter for maximum power output at a desired frequency, proceed as follows:

Step 1. Turn the crystal selector switch to the VHF CRYSTAL position which corresponds to the desired frequency.

Step 2. Interconnect the vhf transmitter antenna connector and the H-18 TRANS OUTPUT connector with Cable Assembly ARC-11369.

Step 3. Turn the test meter switch to the TRANS position and key the microphone.

Step 4. Adjust the tuning slugs to produce maximum output as indicated on the H-18 meter. Adjust the tuning slugs in the following order: oscillator-doubler, amplifier-tripler, and amplifier-doubler.

Note

A two-thirds-scale reading on the H-18 meter indicates normal power output.

Vhf Transmitter R-F Power Comparison. The r-f power output of several vhf transmitters may be compared in the following manner: Tune all transmitters to the same frequency (refer to *VHF Transmitter Tuning*) and record the H-18 meter readings. All meter readings should be approximately the same. A transmitter that is not functioning properly will be indicated by an abnormal meter reading.

Vhf Transmitter Modulation Test. With the transmitter and receiver tuned to the same frequency, press the PRESS TO WHISTLE tuning crank, key the microphone, and speak into it. If the transmitter modulation system is functioning properly, the voice signal will be heard in the headset.

Vhf Transmitter Frequency Range. To check the transmitter frequency range coverage, install a low-limit, mid-range, and high-limit crystal. Tune the transmitter for maximum power output at all three frequencies. (Refer to *VHF Transmitter Tuning* for tuning procedure.) The tuning slugs will go through resonance at all three frequencies with normal power output if the frequency range coverage is correct.

TV-10 Transmitter Test. The transmitter section of the TV-10 can be tested as follows:

Step 1. Interconnect the TV-10 UHF ANT. connector and the H-18 TRANS OUTPUT connector with Cable Assembly ARC-11369.

Step 2. Insert a 240-megacycle crystal in crystal position 1.

Step 3. Turn the crystal selector switch to UHF CRYSTAL position 1.

Step 4. Set the LO-HI fiducial line to the left of UHF CRYSTAL position 1.

Step 5. Turn the test meter switch to TRANS position.

Step 6. Key the microphone and adjust the HI band tuning slugs to produce maximum power output as indicated on the H-18 meter. Adjust the tuning slugs in an ascending order starting with slug 1.

Note

A one-third-scale reading on the H-18 meter indicates normal power output.

Step 7. Plug the 240-megacycle crystal into each crystal socket in turn and set the crystal selector switch to the corresponding UHF CRYSTAL position. Check that the power output is the same for all crystal sockets.

Step 8. Turn the crystal selector switch to a vacant UHF CRYSTAL position and check that there is no power output.

Step 9. Insert 228-, 230-, 240-, 252-, and 258-megacycle crystals in crystal positions 1 through 5 respectively, in an ascending order.

Step 10. Turn the crystal selector switch to UHF CRYSTAL position 1 and repeat Step 6.

Step 11. Turn the crystal selector switch to UHF CRYSTAL position 5 and repeat Step 6.

Step 12. Set the LO-HI fiducial line between UHF CRYSTAL positions 4 and 5.

Step 13. Turn the crystal selector switch to UHF CRYSTAL position 4.

Step 14. Key the microphone and tune the LO band tuning slugs for maximum power output. Adjust the tuning slugs in an ascending order starting with slug 1.

Step 15. Turn the crystal selector switch to UHF CRYSTAL position 3 and repeat Step 14.

Step 16. Turn the crystal selector switch to UHF CRYSTAL position 2 and repeat Step 14.

Step 17. Tune the H-18 to 230 megacycles, press the PRESS TO WHISTLE tuning crank, and speak into microphone. If the modulation system is functioning properly, the voice signal will be heard in the headset.

TV-10 110-MC Oscillator Test.

Step 1. Set the crystal selector switch to any UHF CRYSTAL position.

Step 2. Remove signal input from VHF REC connector.

Step 3. Connect Weston Model 301 ammeter (100-microampere scale) between J4205 on the TV-10 preselector and ground. (Because R4232 shunts the meter movement, the meter will now read full scale for 1 milliampere of crystal current.) The ammeter should read 0.4 milliampere or greater. If there is no reading, or if the reading is less than 0.4 milliampere, refer to the test procedure in the handbooks listed in paragraph 2-5.

TV-10 Crystal Mixer Test.

Step 1. Connect Weston Model 301 ammeter (100-microampere scale) between J4205 on the TV-10 preselector and ground.

Step 2. Throw H-18 LV+ CONTROL switch to the OFF position.

Step 3. Adjust the signal generator to 250 megacycles CW. Set the output attenuator to produce 200 millivolts and inject this signal through the 6-db pad into the UHF ANT. connector on the TV-10. If the mixer crystal is good an indication of at least 0.3 milliampere will be observed on the meter.

TV-10 Over-all Sensitivity.

Step 1. Turn test meter switch to TEL 3V position.

Step 2. Connect the signal generator output through the 6-db pad to the UHF ANT. connector on the TV-10.

Step 3. Adjust the signal generator to 255 megacycles, 30 per cent amplitude-modulated with 1000 cps.

Step 4. Tune the H-18 to 255 megacycles.

Step 5. Set the signal generator output attenuator to produce 1.73 volts on the H-18 meter. The signal generator output attenuator reading should be 10 microvolts or less.

Step 6. Adjust the signal generator to 243 megacycles, 30 per cent modulated with 1000 cps.

Step 7. Tune the H-18 to 243 megacycles.

Step 8. Adjust the signal generator output attenuator to produce 1.73 volts on the H-18 meter. The signal generator output attenuator should read 9 microvolts or less.

Step 9. Adjust the signal generator to 230 megacycles, 30 per cent modulated with 1000 cps.

Step 10. Tune the H-18 to 230 megacycles. Adjust the signal generator to produce 1.73 volts on the H-18 meter. The signal generator output attenuator reading should be 14 microvolts or less.

K-13 Oscillator Output Test.

Step 1. Set the test meter switch to TEL 30V position.

Step 2. Turn the K-13 VHF WHISTLE LEVEL control to its maximum clockwise position.

Step 3. Turn the crystal selector switch to the VHF CRYSTAL position corresponding to the center of the vhf transmitter frequency band.

Step 4. Press in PRESS TO WHISTLE tuning crank and tune the R-19 to the transmitter. A 1-kc tone should be audible in the headset and the H-18 meter should read at least 7 volts when the receiver is accurately tuned to the transmitter.

"Whistle-Through" Level Adjustments.

Step 1. Set the test meter switch to TEL 3V position.

Step 2. Turn the K-13 UHF and VHF WHISTLE LEVEL controls to their approximate mid-positions.

Step 3. Turn the crystal selector switch to the VHF CRYSTAL position corresponding to the center of the vhf transmitter frequency band.

Step 4. Press in PRESS TO WHISTLE tuning crank and tune the R-19 to the transmitter. Adjust the K-13 VHF WHISTLE LEVEL control to produce 1 volt on the H-18 meter.

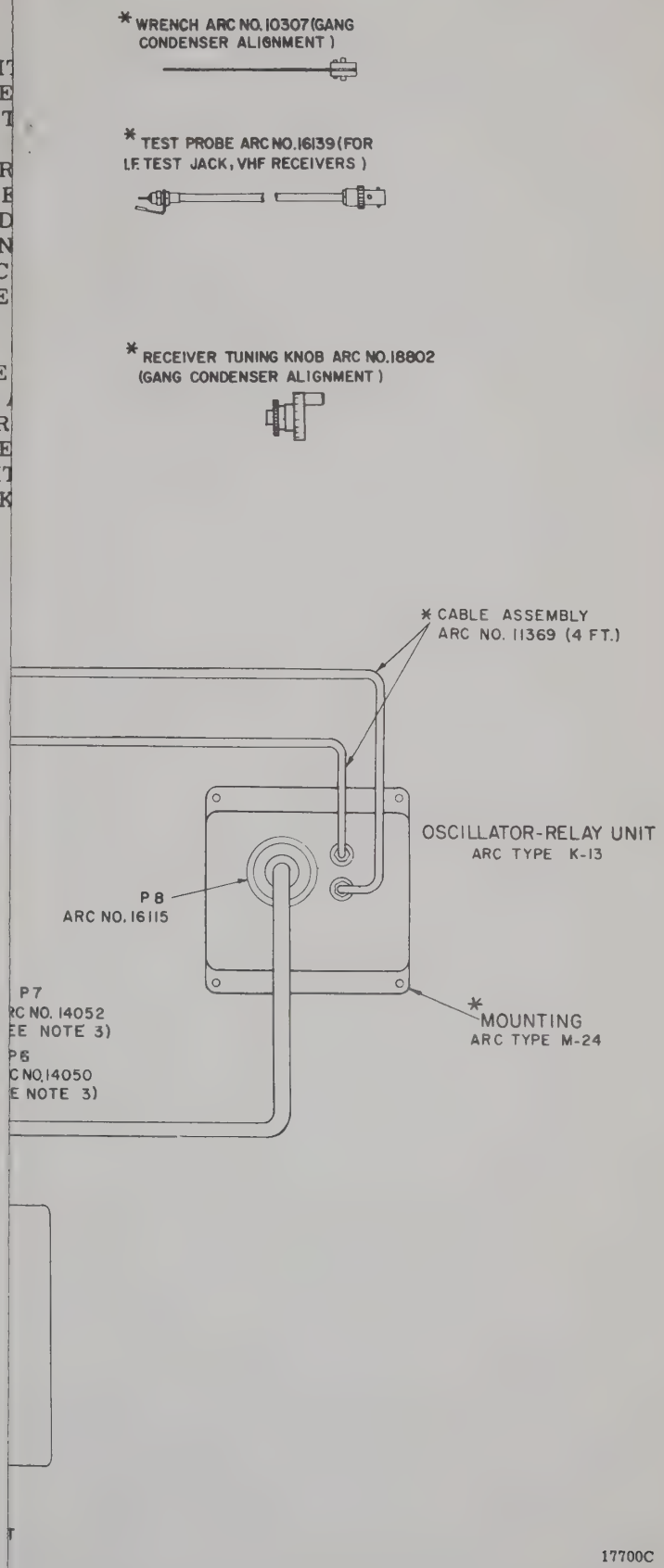
Step 5. Turn the crystal selector switch to the UHF CRYSTAL position corresponding to the center of the TV-10 high band. Set the LO-HI fiducial line just to the left of this UHF CRYSTAL position.

Step 6. Press in PRESS TO WHISTLE tuning crank and tune the R-19 to the TV-10. Adjust the K-13 UHF WHISTLE LEVEL control to produce 1 volt on the H-18 meter.

NOTES

NOTES:

1. ONLY THOSE UNI
   ASTERISK (*) ARE
   KIT ARC TYPE BT
2. FOR SCHEMATIC
3. CONNECTIONS AR
   VHF TRANSMITTE
   R-20 OR R-20A, D
   MITTER AND CON
   HARNESS TO REC
   THROUGH CABLE
   AS SHOWN.
4. COAXIAL CABLE
   FOR MEASUREME
   POWER OUTPUT
   THROUGH" OPER
   NECTIONS (FOR E
   RECEIVER SENSI
   STRUCTION BOOK


* WRENCH ARC NO. 10307 (GANG CONDENSER ALIGNMENT)
* TEST PROBE ARC NO. 16139 (FOR I.F. TEST JACK, VHF RECEIVERS)
* RECEIVER TUNING KNOB ARC NO. 18802 (GANG CONDENSER ALIGNMENT)
* CABLE ASSEMBLY ARC NO. 11369 (4 FT.)
OSCILLATOR-RELAY UNIT ARC TYPE K-13
P 8 ARC NO. 16115
P7
RC NO. 14052
EE NOTE 3)
P6
C NO. 14050
E NOTE 3)
* MOUNTING ARC TYPE M-24

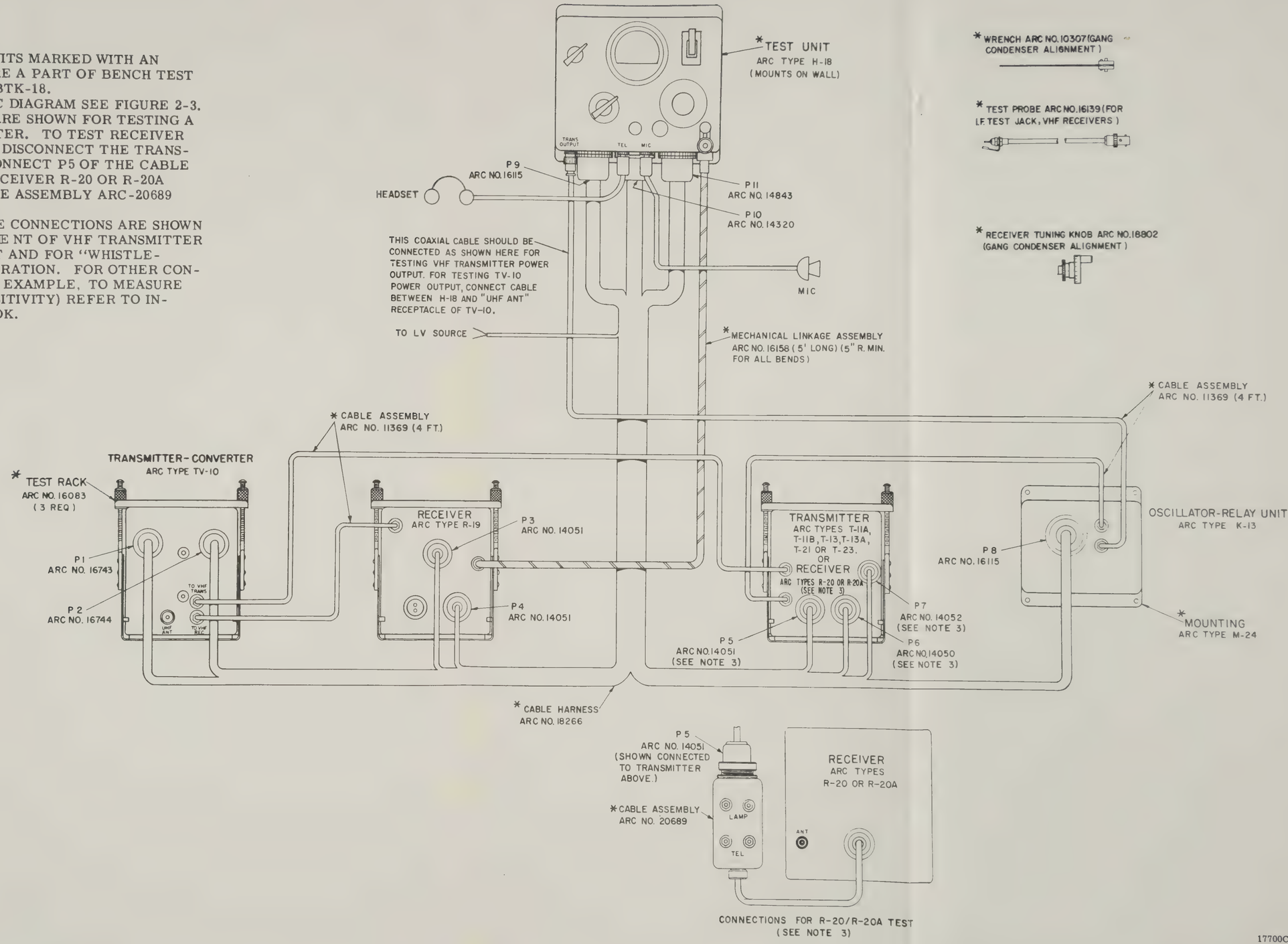
17700C

Figure 2–2. Bench Test Interconnection Diagram for ARC Type BTK-18 Bench Test Kit

NOTES

NOTES:

1. ONLY THOSE UNITS MARKED WITH AN ASTERISK (*) ARE A PART OF BENCH TEST KIT ARC TYPE BTK-18.
2. FOR SCHEMATIC DIAGRAM SEE FIGURE 2-3.
3. CONNECTIONS ARE SHOWN FOR TESTING A VHF TRANSMITTER. TO TEST RECEIVER R-20 OR R-20A, DISCONNECT THE TRANSMITTER AND CONNECT P5 OF THE CABLE HARNESS TO RECEIVER R-20 OR R-20A THROUGH CABLE ASSEMBLY ARC-20689 AS SHOWN.
4. COAXIAL CABLE CONNECTIONS ARE SHOWN FOR MEASUREME NT OF VHF TRANSMITTER POWER OUTPUT AND FOR "WHISTLE-THROUGH" OPERATION. FOR OTHER CONNECTIONS (FOR EXAMPLE, TO MEASURE RECEIVER SENSITIVITY) REFER TO INSTRUCTION BOOK.



17700C

Figure 2–2. Bench Test Interconnection Diagram for ARC Type BTK-18 Bench Test Kit

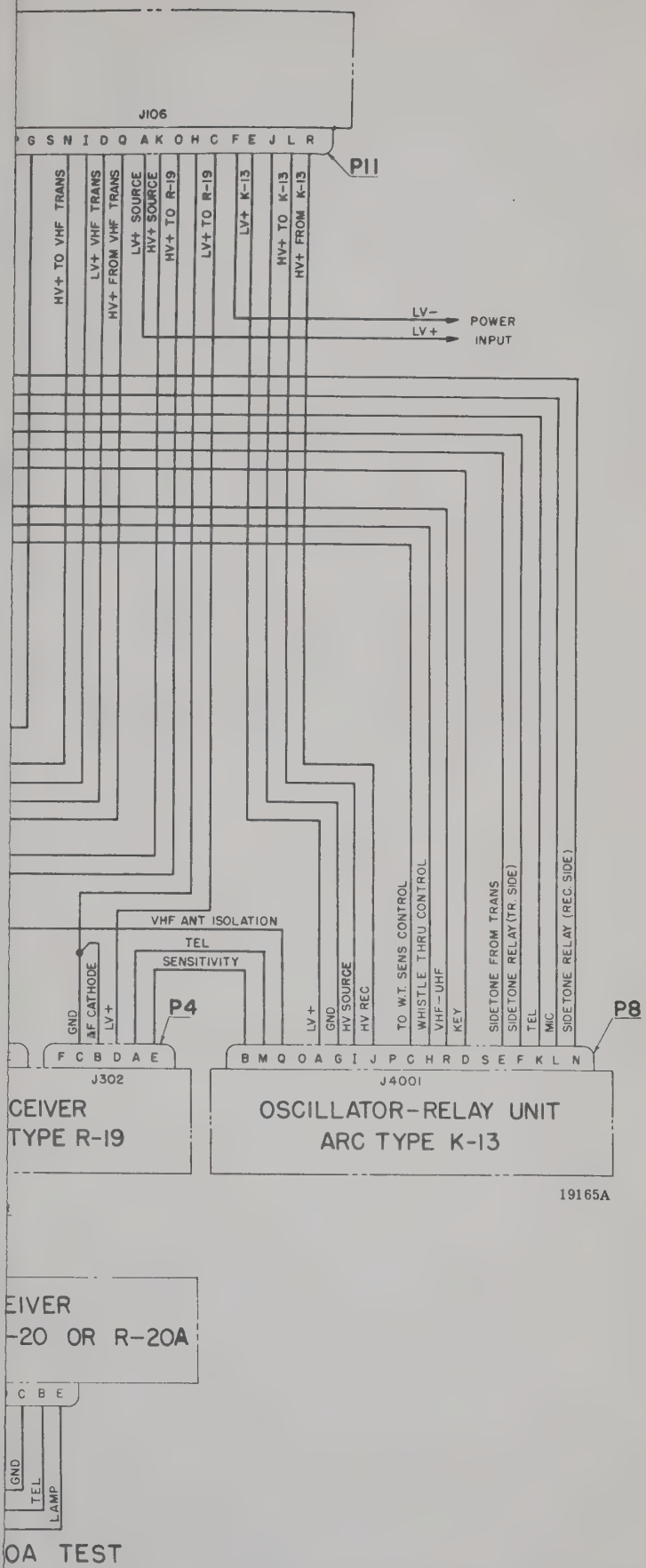
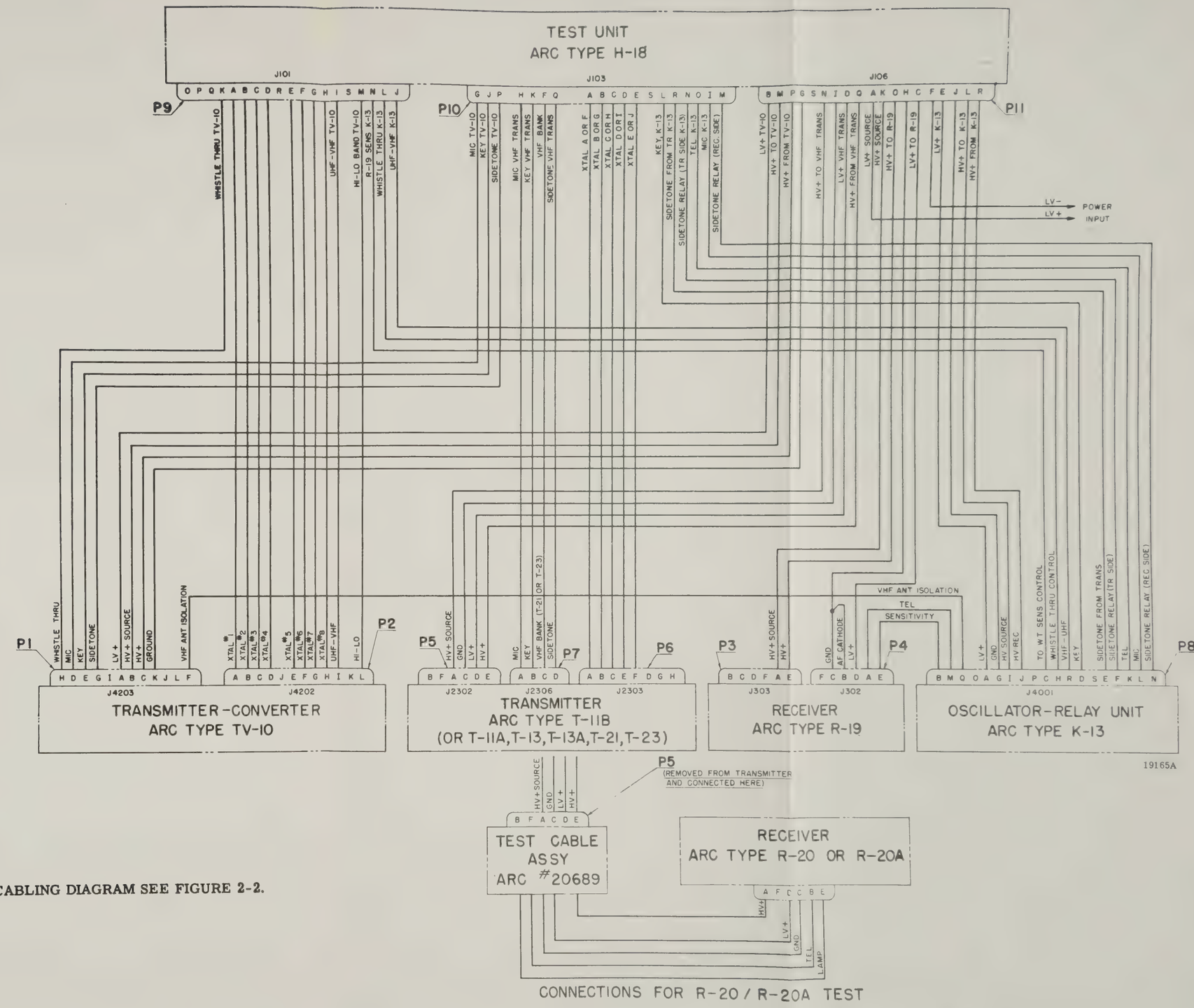


Figure 2–3. ARC Type BTK-18 Bench Test Kit, External Schematic Diagram



NOTE:
FOR CABLING DIAGRAM SEE FIGURE 2-2.

Figure 2–3. ARC Type BTK-18 Bench Test Kit, External Schematic Diagram

SECTION III
MAINTENANCE

3–1. GENERAL.

The ARC Type BTK-18 Bench Test Kit does not require special maintenance procedures; however, normal care in handling the Bench Test Kit will promote trouble-free operation of the test system.

The bottom cover of the Test Unit may be removed for meter calibration and inspection of internal component parts. An interior view of the H-18 is shown in Figure 3-2. Included in this section are schematic and wiring diagrams of the ARC Type H-18 (Figures 3-3 and 3-4) and schematic and wiring diagrams of Cable Assembly ARC-20689 (Figures 3-5 and 3-6).

3–2. PREVENTIVE MAINTENANCE.

A schedule of preventive maintenance will help prevent defective operation. No special checks are required; however, depending upon the frequency of use, it is suggested that the following visual inspections be made:

a. Components should be free from dirt, grime, and grease.

b. Panel markings should be legible.

c. Wiring, connectors, and test jacks should be electrically and mechanically secure, with clean, uncorroded terminals.

d. Mechanical Linkage casings should not be sharply bent or broken. The shafting should rotate freely. All terminations of the linkage should be secure. In use the linkage should be reasonably straight; do not make any bend-radius greater than 5 inches.

3–3. LUBRICATION.

If friction develops in the tuning crank, apply a small amount of Esso Beacon #325 Grease, or equivalent, to the tuning crank bearing surfaces.

Two or three drops of Pioneer #10 Oil, or equivalent, may be used to lubricate the under edge of the frequency dial. All excess oil should be removed after the shutter mechanism has been operated several times.

3–4. METER CALIBRATION.

The test meter included in the H-18 should be checked for accuracy from time to time. R111 and R112 in the meter circuitry (see Figure 3-2) are used for calibration. If the meter becomes inaccurate, proceed as follows:

Step 1. Connect a 1000-ohm (±1%) resistor to pin N of J101 (see Figure 3-1).

Step 2. Connect a variable d-c voltage supply across the 1000-ohm resistor and the H-18 chassis.

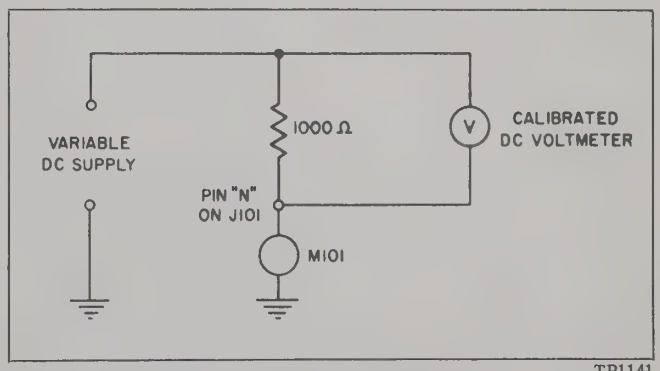
Step 3. Connect a calibrated 20,000 ohm/volt d-c voltmeter across the 1000-ohm resistor.

Step 4. Set the H-18 SENS control to zero ohms.

Step 5. Adjust the d-c voltage supply to produce a 30-volt reading across the 1000-ohm resistor.

Step 6. Adjust R112 until M101 reads 30.

Step 7. Connect 10 volts (2 watts) of vhf transmitter power to J102. Adjust R111 until M101 reads 20.

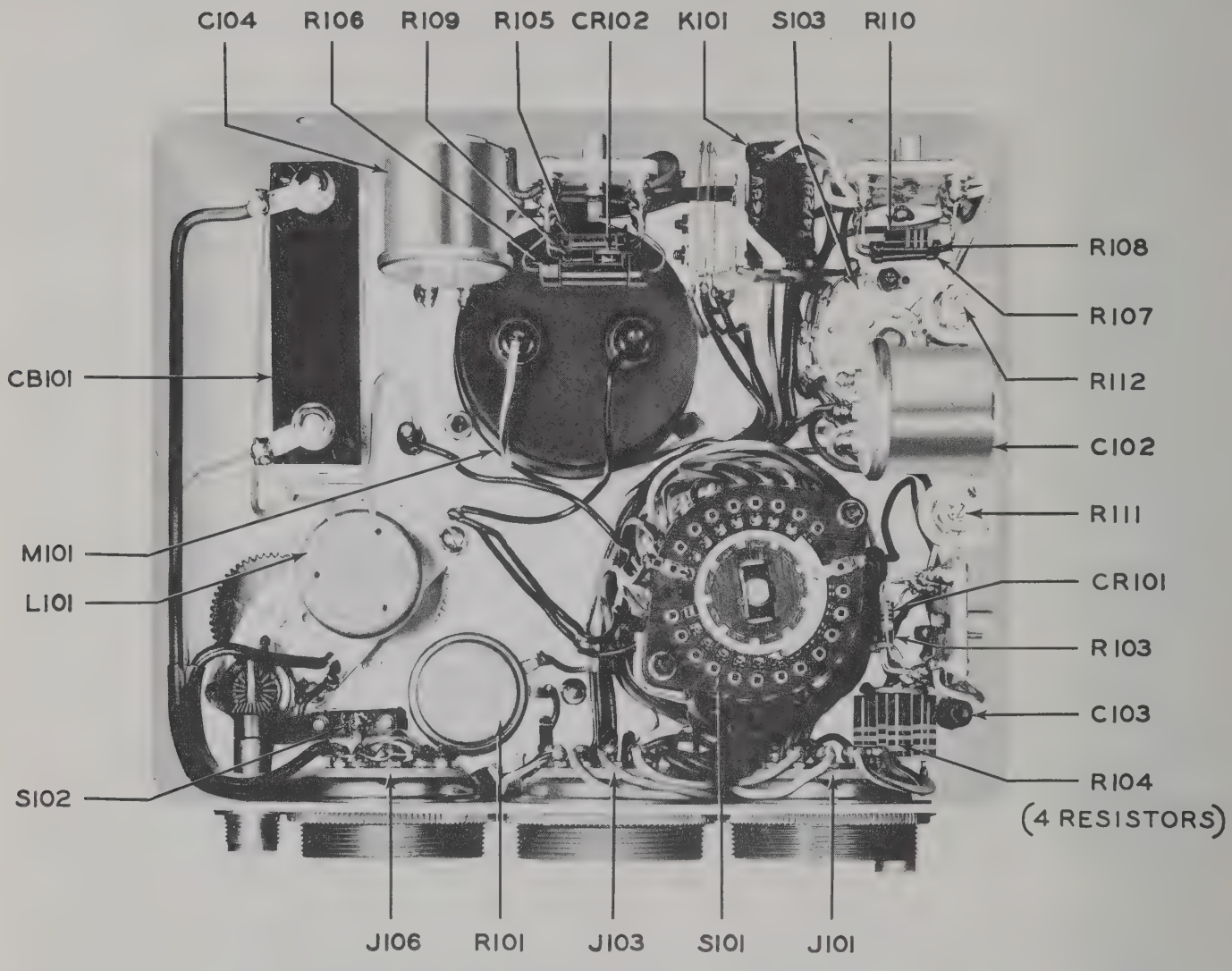


TP1141

Figure 3–1. Schematic Diagram for H-18 Meter Test Set-up

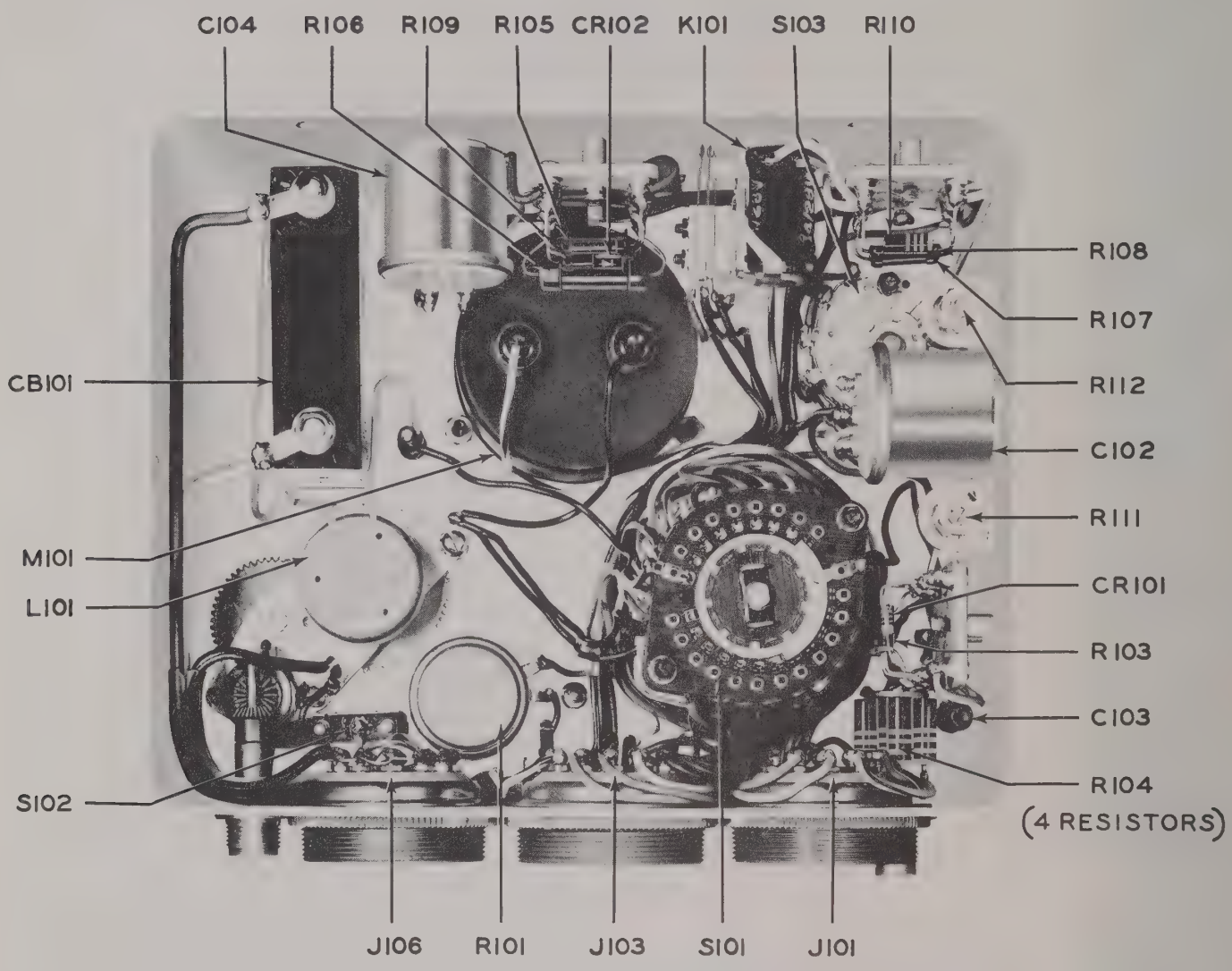
3–5. COAXIAL CABLE REPAIR.

Figure 3-7 supplies information for repairing or fabricating coaxial cables such as the ARC-11369.



TP1034

Figure 3–2. ARC Type H-18 Test Unit, Rear Interior View



TP1034

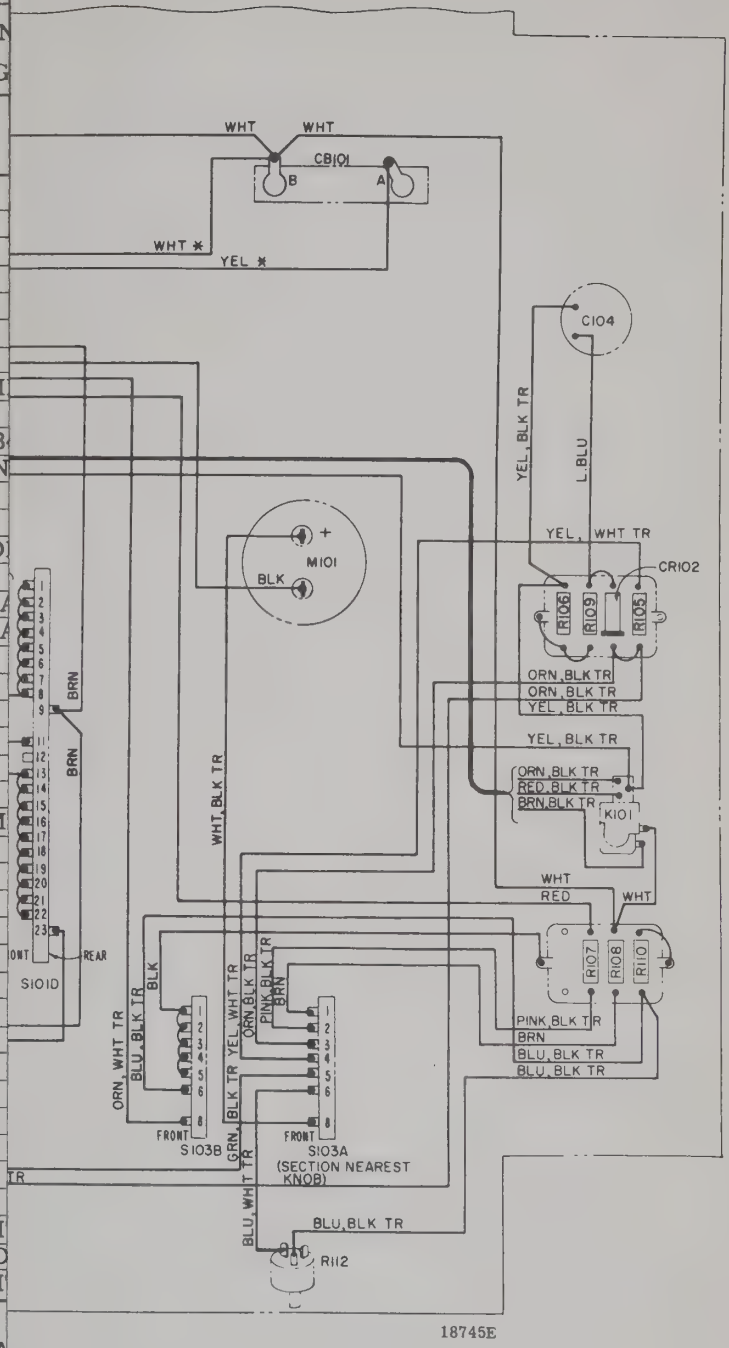
Figure 3–2. ARC Type H-18 Test Unit, Rear Interior View

Insert
Foldout/Map
Here

SYMBOL IDENTIFICATIO		
MULTIPLIERS FOR RESISTAN K=1,000 MEG		
SYMBOL NO.	DRAWING NO.	
C101	8796	
C102A		
C102B	5414	
C102C		
C103	8796	
C104	16653	
CB101	18636	CI
CR101	15534	1N3
CR102	18723	1N
J101	12357	
J102	PART OF RESISTO	
J103	12096	
J104	7565	JA
J105	9391	JA
J106	12350	
K101	19248	
L101	17074	
M101	18588	M
R101	6310	
R102	201	
R103	201	
R104	16041	
R105	205	
R106	208	
R107	205	
R108	205	
R109	205	
R110	201	
R111	8825	
R112	8737	
S101A, B, C, D	18578	SWI
S102	17176	SPD
S103A, B	18567	SWI

NOTES:

1. FOR SCHEMATIC DIAGRAN
2. WIRES MARKED WITH COI #22 SOLID COPPER, VINY
3. WIRES MARKED WITH COI ASTERISK (*) ARE #18 STR VINYLITE INSULATED.
4. UNMARKED WIRES ARE #2 SOLID COPPER.
5. SHADED PORTIONS OF CR CR101 AND CR102 INDICAT
6. THE INDICATED LEAD MU POSSIBLE AND AT LEAST OTHER WIRES AND CHASS
7. TUBING OF APPROPRIATE WIRES INDICATED Q____.



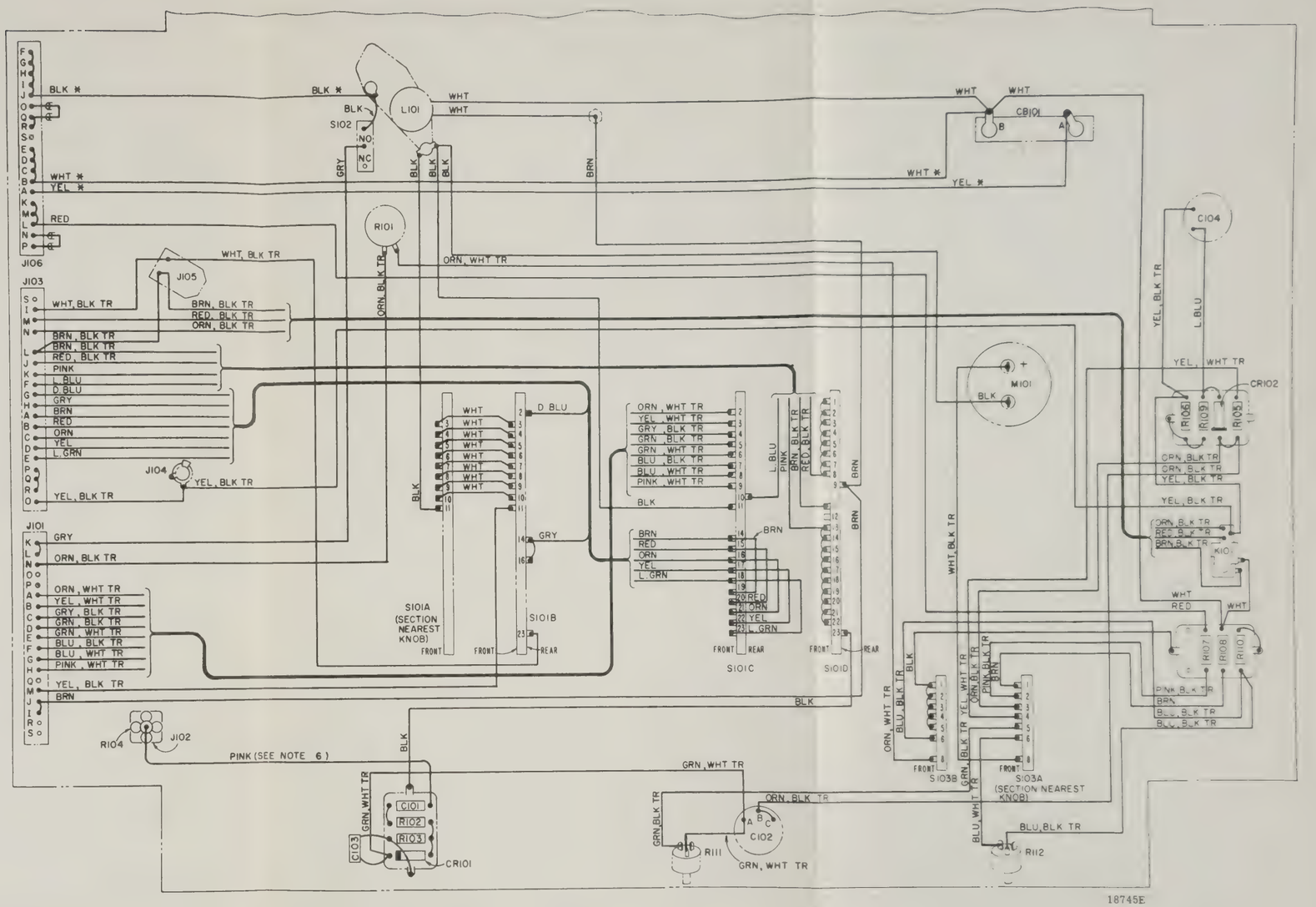
ROTOR TERMINAL (FRONT)

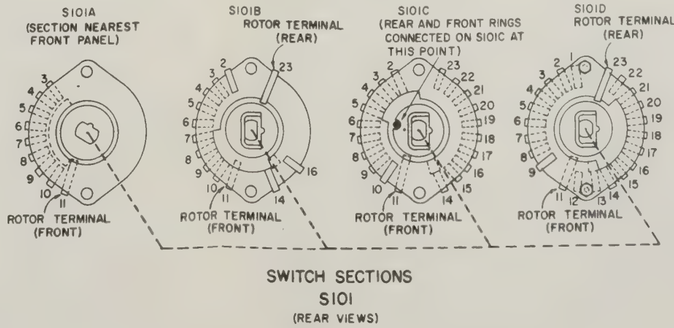
Figure 3–4. ARC Type H-18 Test Unit, Wiring Diagram

SYMBOL IDENTIFICATION TABLE		
MULTIPLIERS FOR RESISTANCE VALUES: K=1,000 MEG=1,000,000		
SYMBOL NO.	DRAWING NO.	DESCRIPTION
C101	8796	100 μμF
C102A		.05 μF
C102B	5414	.05 μF
C102C		.05 μF
C103	8796	100 μμF
C104	16653	1 μF
CB101	18636	CIRCUIT BREAKER
CR101	15534	1N34AG (SEE NOTE 5)
CR102	18723	1N91 (SEE NOTE 5)
J101	12357	RECEPTACLE
J102	PART OF RESISTOR ASSY NO. 16041	
J103	12096	RECEPTACLE
J104	7565	JACK ASSEMBLY
J105	9391	JACK ASSEMBLY
J106	12350	RECEPTACLE
K101	19248	RELAY
L101	17074	SOLENOID
M101	18588	MICROAMMETER
R101	6310	0-50K OHMS
R102	201	470 OHMS
R103	201	10K OHMS
R104	16041	50 OHMS
R105	205	190K
R106	208	300 OHMS
R107	205	1.5MEG
R108	205	150K
R109	205	16K
R110	201	10 OHMS
R111	8825	0-100K OHMS
R112	8737	0-2.5K OHMS
S101A, B, C, D	18578	SWITCH (4 SECTION)
S102	17176	SPDT MICROSWITCH
S103A, B	18567	SWITCH (2 SECTION)

NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 3-3.
2. WIRES MARKED WITH COLOR NOTE ONLY ARE #22 SOLID COPPER, VINYLITE INSULATED.
3. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE #18 STRANDED COPPER, VINYLITE INSULATED.
4. UNMARKED WIRES ARE #24 BARE, TINNED, SOLID COPPER.
5. SHADED PORTIONS OF CRYSTAL RECTIFIERS CR101 AND CR102 INDICATE CATHODE ENDS.
6. THE INDICATED LEAD MUST BE AS SHORT AS POSSIBLE AND AT LEAST 1/4" AWAY FROM OTHER WIRES AND CHASSIS.
7. TUBING OF APPROPRIATE SIZE USED OVER WIRES INDICATED Q____.





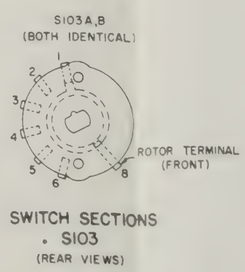
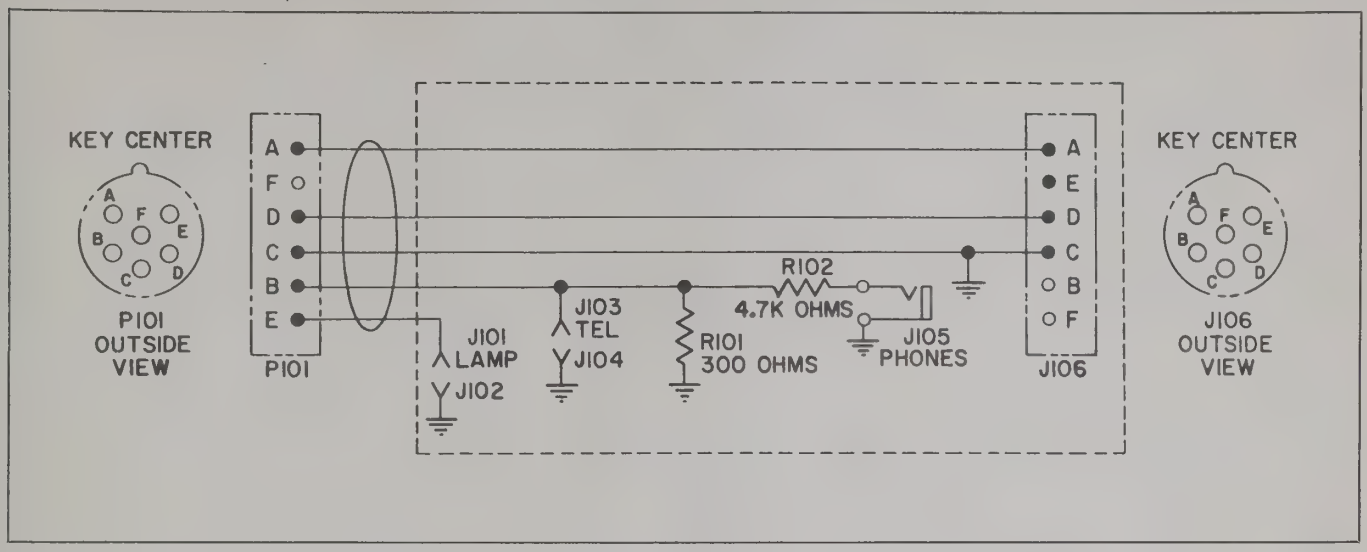
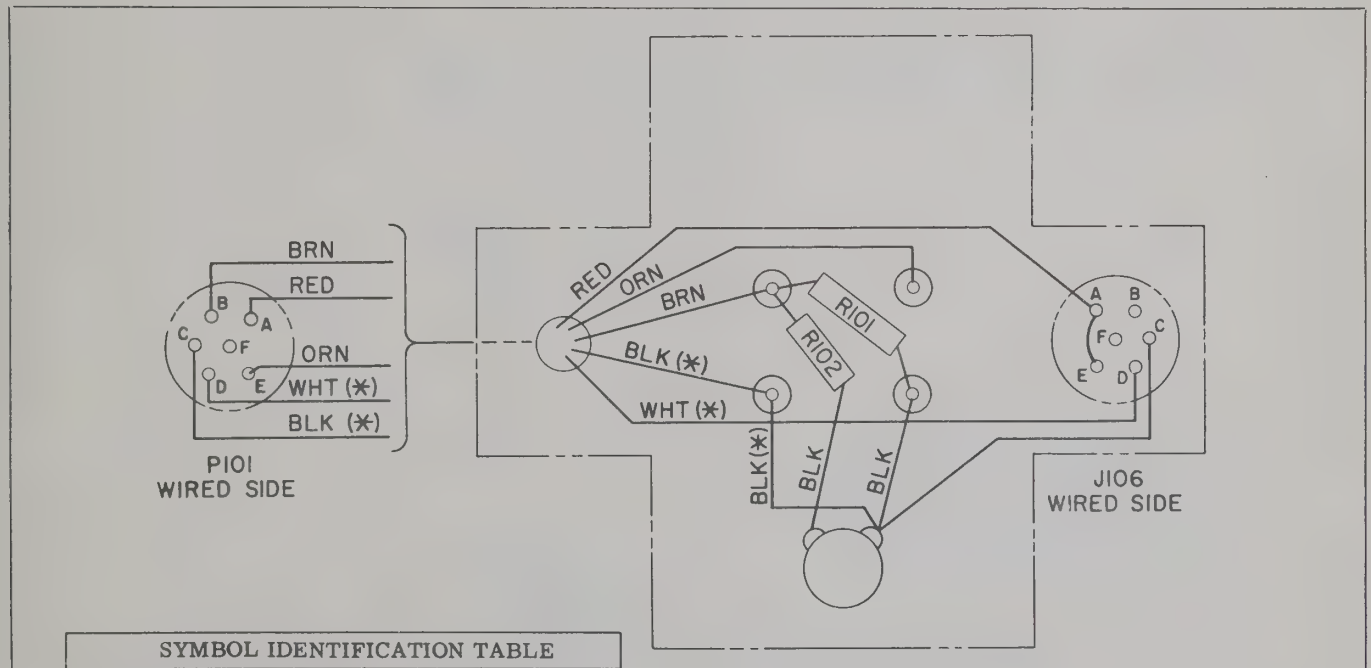


Figure 3–4. ARC Type H-18 Test Unit, Wiring Diagram



TP1137

Figure 3–5. Cable Assembly ARC-20689, Schematic Diagram



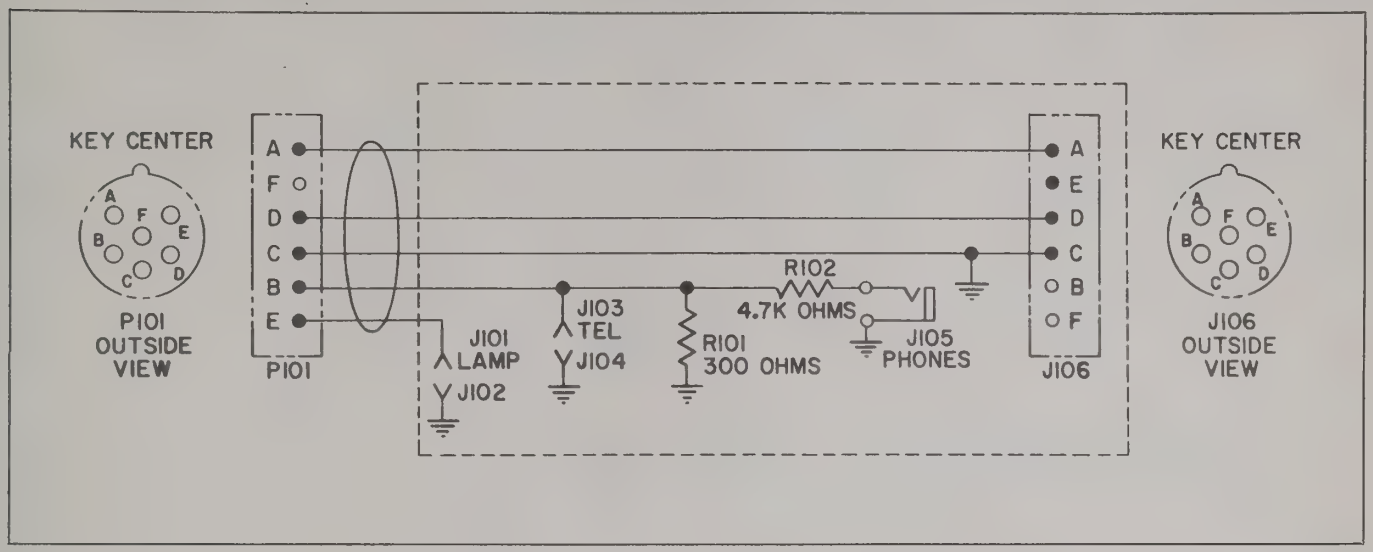
SYMBOL IDENTIFICATION TABLE		
Symbol No.	Drawing No.	Description
J101	8803	TEST JACK (ORANGE)
J102	8803	TEST JACK (BLACK)
J103	8803	TEST JACK (BROWN)
J104	8803	TEST JACK (BLACK)
J105	7565	JACK
J106	11905	RECEPTACLE
P101	20764	PLUG ASSEMBLY
R101	202	300 OHMS
R102	201	4700 OHMS

NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 3-5.
2. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE #22 STRANDED COPPER, VINYLITE INSULATED.
3. WIRES MARKED WITH COLOR NOTE ONLY ARE #24 STRANDED COPPER, VINYLITE INSULATED.
4. UNMARKED WIRE IS #22 SOLID, BARE, TINNED COPPER.

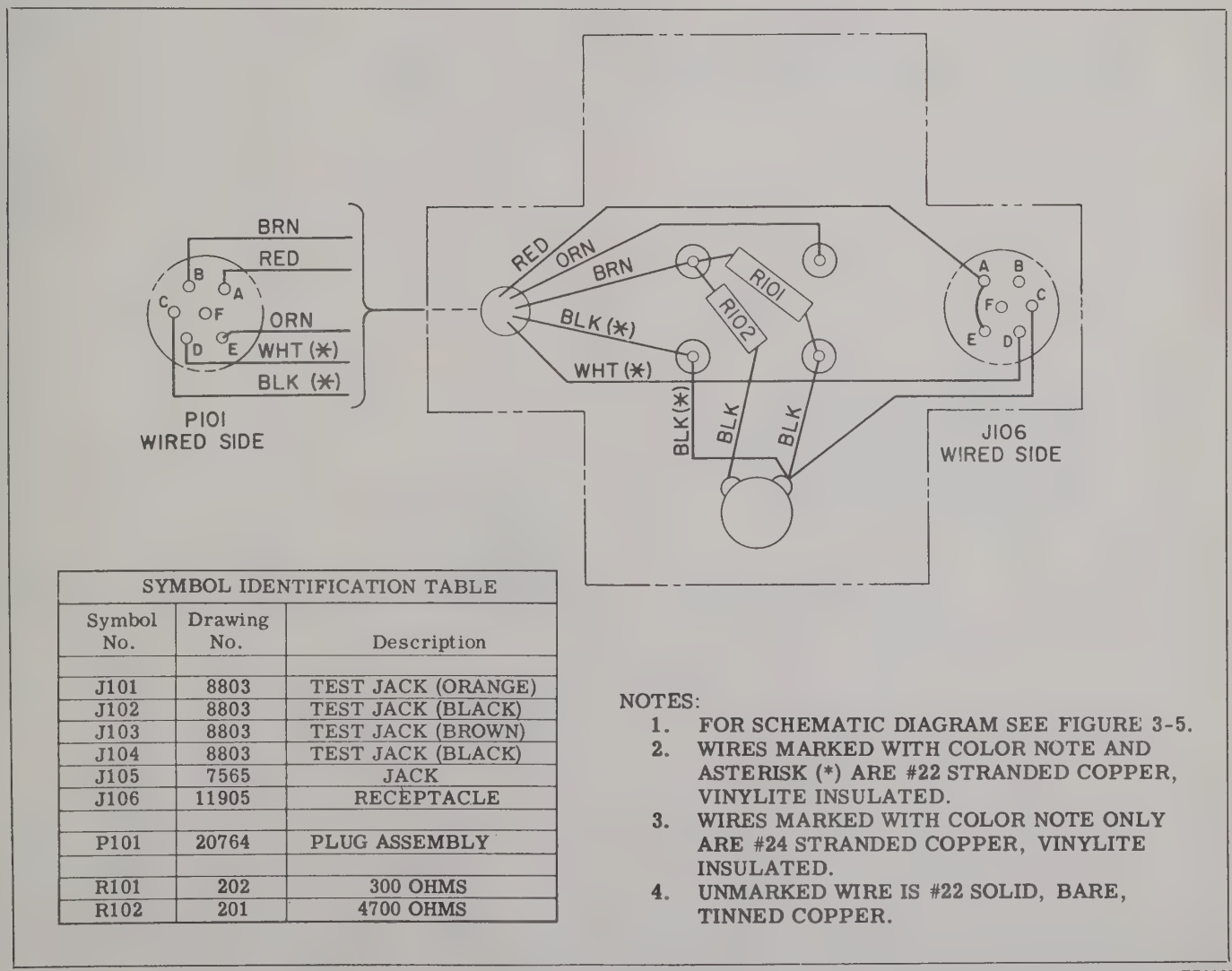
TP1139

Figure 3–6. Cable Assembly ARC-20689, Wiring Diagram



TP1137

Figure 3–5. Cable Assembly ARC-20689, Schematic Diagram



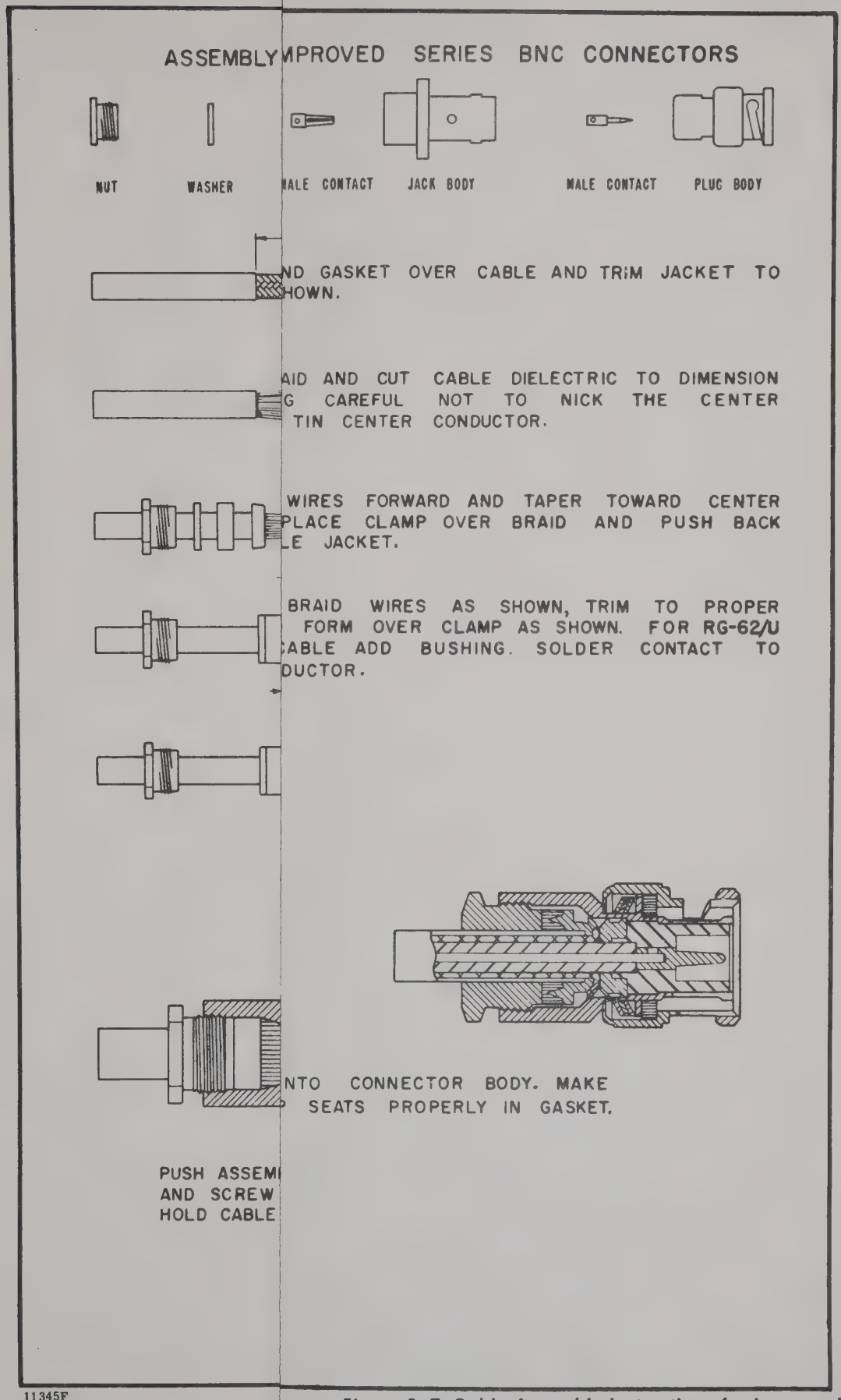
SYMBOL IDENTIFICATION TABLE		
Symbol No.	Drawing No.	Description
J101	8803	TEST JACK (ORANGE)
J102	8803	TEST JACK (BLACK)
J103	8803	TEST JACK (BROWN)
J104	8803	TEST JACK (BLACK)
J105	7565	JACK
J106	11905	RECEPTACLE
P101	20764	PLUG ASSEMBLY
R101	202	300 OHMS
R102	201	4700 OHMS

NOTES:

1. FOR SCHEMATIC DIAGRAM SEE FIGURE 3-5.
2. WIRES MARKED WITH COLOR NOTE AND ASTERISK (*) ARE #22 STRANDED COPPER, VINYLITE INSULATED.
3. WIRES MARKED WITH COLOR NOTE ONLY ARE #24 STRANDED COPPER, VINYLITE INSULATED.
4. UNMARKED WIRE IS #22 SOLID, BARE, TINNED COPPER.

TP1139

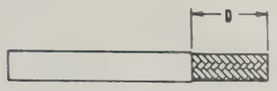
Figure 3–6. Cable Assembly ARC-20689, Wiring Diagram



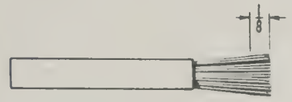
11345F

Figure 3–7. Cable Assembly Instructions for Improved Type BNC Connector and RG-58/U Cable

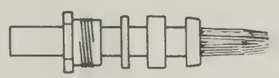
ASSEMBLY INSTRUCTIONS FOR SERIES BNC CONNECTORS



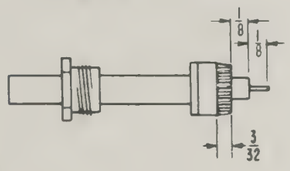
TRIM JACKET:
D = 1/4 FOR RG-58/U
D = 5/16 FOR RG-59/U
D = 7/16 FOR RG-71/U



COMB OUT BRAID AND CUT CABLE DIELECTRIC TO DIMENSION SHOWN BEING CAREFUL NOT TO NICK THE CENTER CONDUCTOR. TIN CENTER CONDUCTOR.

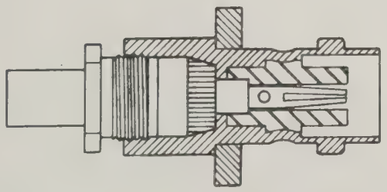


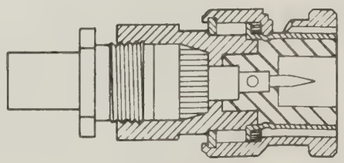
TAPER BRAID AND SLIDE NUT, WASHER, GASKET AND CLAMP OVER BRAID. CLAMP IS INSERTED SO THAT ITS INNER SHOULDER FITS SQUARELY AGAINST END OF CABLE JACKET.



WITH CLAMP IN PLACE, COMB OUT BRAID, FOLD BACK SMOOTH AS SHOWN AND TRIM 3/32" FROM END.

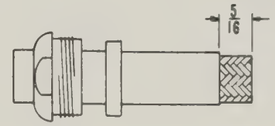
SLIP CONTACT IN PLACE, BUTT AGAINST DIELECTRIC AND SOLDER. REMOVE EXCESS SOLDER FROM OUTSIDE OF CONTACT. BE SURE CABLE DIELECTRIC IS NOT HEATED EXCESSIVELY AND SWOLLEN SO AS TO PREVENT DIELECTRIC FROM ENTERING INTO CONNECTOR BODY.



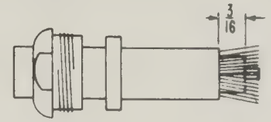


PUSH ASSEMBLY INTO BODY AS FAR AS IT WILL GO. SLIDE NUT INTO BODY AND SCREW IN PLACE WITH WRENCH UNTIL TIGHT. FOR THIS OPERATION, HOLD CABLE AND SHELL RIGID AND ROTATE NUT.

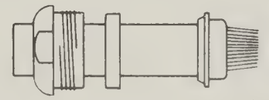
ASSEMBLY INSTRUCTIONS FOR IMPROVED SERIES BNC CONNECTORS



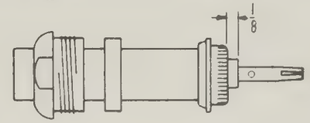
PLACE NUT AND GASKET OVER CABLE AND TRIM JACKET TO DIMENSION SHOWN.



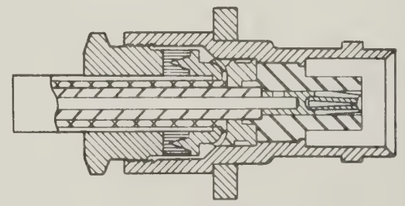
COMB OUT BRAID AND CUT CABLE DIELECTRIC TO DIMENSION SHOWN BEING CAREFUL NOT TO NICK THE CENTER CONDUCTOR. TIN CENTER CONDUCTOR.

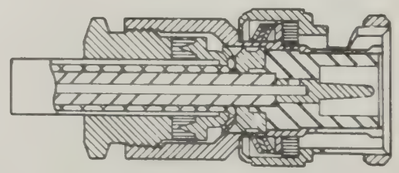


PULL BRAID WIRES FORWARD AND TAPER TOWARD CENTER CONDUCTOR. PLACE CLAMP OVER BRAID AND PUSH BACK AGAINST CABLE JACKET.



FOLD BACK BRAID WIRES AS SHOWN, TRIM TO PROPER LENGTH AND FORM OVER CLAMP AS SHOWN. FOR RG-62/U AND RG-71/U CABLE ADD BUSHING. SOLDER CONTACT TO CENTER CONDUCTOR.





INSERT CABLE AND PARTS INTO CONNECTOR BODY. MAKE SURE SHARP EDGE OF CLAMP SEATS PROPERLY IN GASKET. TIGHTEN NUT.

11345F

Figure 3–7. Cable Assembly Instructions for Improved Type BNC Connector and RG-58/U Cable

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